TITLE: **Development of Cognitive Bias Modification (CBM) Tools to Promote Adjustment during Reintegration following Deployment**

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CONTRACTING ORGANIZATION: Tel Aviv University
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13. SUPPLEMENTARY NOTES

14. ABSTRACT The overarching goal of the grant is to develop valid and reliable computerized tools to measure and modify anger-related cognitive biases and ultimately to examine their efficiency in reducing anger and adjustment difficulties among soldiers. The first aim of the research, addressed in Study 1, was to measure the associations between state and trait anger and biases in anger-related attention and interpretation. This aim was addressed in the completion of study 1, and the publication of a scientific report describing its findings. Study 6 of the grant has been performed - 80 participants with high trait anger scores have participated in the study at TAU. A mirror study via collaboration with Bristol University using the same protocol as the one used at TAU, was completed during the past year, thus contributing to enhance and increase generalization of the findings. The Bristol study (reported in the previous annual report) is not related to the current funding. During the past year data from the two samples has been analyzed and a scientific report describing the findings is in final stages of preparation before submission for publication. Also, during the past year the data collection for Study 5 of the grant has been completed. Cognitive and behavioral data from this study have been analyzed and presented in the recent MOMRP conference, and physiological SCR data are in the last stages of analyses.

15. SUBJECT TERMS anger, aggression, attention bias, interpretation bias, cognitive bias modification

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INTRODUCTION

To enhance military performance in combat, soldiers learn to selectively attend to potential threats and to weigh any ambiguous information in the context of potential life-threatening danger. The development of such cognitive biases is expected to enhance soldiers' life preserving actions that among others include the use of combat-related aggressive action. Although the tendency to promptly and aggressively respond to potential threats in combat is crucial for survival, it may prove maladaptive in non-combat environments. Since deployed soldiers confront dramatic changes in environmental threat conditions, ranging from safety to acute danger, considerable plasticity in threat-related attention and threat interpretation is required. Insufficient plasticity in threat processing may confer risk for military performance and psychological adjustment both in theatre and upon reintegration back to civilian environments.

The overarching goal of the current grant is to develop valid and reliable computerized tools to measure and modify anger-related cognitive biases and ultimately to examine their efficiency in reducing anger and adjustment difficulties among soldiers. This goal is perused through unique research collaboration between WRAIR and Tel Aviv University offering a combination of experts in advanced psychological research in military context and in translational cognitive-neuroscience research.

BODY

Recruitment of participants and data collection:

In the past year we collected data for Study 5. As proposed, we hope to determine: a) whether this cognitive bias modification is effective in reducing attention and interpretation biases; and b) whether this cognitive bias modification is effective in reducing anger levels. Data collection has been completed (80 participants have participated in the study).

Data recording and preparation:

Data obtained from study 5 was coded and has been prepared for analysis.

Data analysis:

Study 6 – data from the TAU sample and the Bristol sample have been analyzed.

Study 5 - Cognitive and behavioral data from Study 5 have been analyzed, and the physiological SCR data are in the last stages of analyses.

Publications:

A scientific paper describing Study 1 findings has been written and was recently published in *Cognition and Emotion* (Maoz, K., Adler, A.B., Bliese, P.D., Sipos, M.L., Quartana, P.J., Bar-Haim, Y., 2016. Attention and interpretation processes and trait anger experience, expression, and control. Cognition and Emotion, 1-12).

Problem areas

No problems were encountered in conducting the study.

Future plans

The findings of study 6 are in final stages of preparation before submission for publication. Also, the physiological SCR data are in the last stages of analyses.

KEY RESEARCH ACCOMPLISHMENTS

- A Scientific report describing the findings of Study 1 has been published in *Cognition and Emotion*.

- Data from Study 6 has been analyzed.

- Data collection in Study 5 has been completed.

- Data collected from Study 5 has been coded.

- Cognitive and behavioral data from Study 5 has been analyzed

- Physiological data (SCR) from Study 5 has been prepared for analysis.

REPORTABLE OUTCOME

The key findings from study 1 suggest that attention bias toward angry faces in the dot probe task was associated with higher trait anger and anger expression and with lower anger control-in and anger control-out. Also, the propensity to quickly interpret ambiguous faces as angry (interpretation bias) was associated with greater anger expression and its subcomponent of anger expression-out and with lower anger control-out.

The key findings from study 6 suggest that computerized cognitive interpretation training has demonstrated high efficiency in reducing anger-related interpretations of ambiguous faces, and that this effect generalized to novel faces which were not part of the training protocol. Moreover, after receiving an unfair offer in an ultimatum game, participants in the active training group showed less displaced anger retaliation toward a neutral player, as manifested in significantly fairer offers compared to the placebo training group. The two groups did not differ in their offers to a bluntly unfair player (direct retaliation).

Initial analyses of data from study 5 suggest that behaviors related to displaced anger may be diminished via modification of anger-related attention processes.

CONCLUSION

- Faster attention orientation and faster negative interpretation of threatening stimuli, as compared to non-threatening stimuli, are associated with greater self-reported anger, with differential patterns of associations between the two cognitive processes and the sub-components of anger experience, expression, and regulation. Interactions between attention and interpretation biases did not contribute to the prediction of any anger component suggesting that attention and interpretation biases may function as distinct mechanisms.

- It appears that interpretation biases and their modification protocols offer a more stable and reliable target for future studies and potential implementation for soldiers with anger control difficulties.

- It seems that these cognitive modification protocols have stronger effect on behaviors related to displaced anger, compared to direct anger.

- If one well-powered RCT is to be funded to pursue the findings of the current project, it appears that:

    a) Either the Bristol or TAU versions of the morph interpretation bias modification task is a viable selection.

    b) The RCT could be applied in the context of anger management treatments for soldiers.

    c) Outcomes of such RCT would ideally include indirect (behavioral, physiological) measures as well as assessments from independent evaluators in addition to self-reports of anger.

REFERENCES

Maoz, K., Adler, A.B., Bliese, P.D., Sipos, M.L., Quartana, P.J., Bar-Haim, Y., 2016. Attention and interpretation processes and trait anger experience, expression, and control. Cognition and Emotion, 1-12.

Development of Cognitive Bias Modification (CBM) Tools to Promote Adjustment during Reintegration following Deployment

Proposal ID: **11207005**, Award Number: W81XWH1320001

PI: Prof. Yair Bar-Haim   **Org:** Tel-Aviv University   **Award Amount: $699**

DMRDP

Study/Product Aim(s)

• Develop valid and reliable computerized tools to measure and modify anger-related cognitive biases and ultimately to examine their efficiency in reducing anger and adjustment difficulties among soldiers returning from deployment

Approach

a) Examining the associations between threat-related attention and interpretation biases) and anger-related symptoms in civilian and military populations.

b) Examining the efficiency of computer-based cognitive bias modification training (CBM) in modifying attention and interpretation biases and reducing anger-related symptoms in a civilian population (undergraduate students)

c) Randomized control trial delivered to soldiers following combat deployment.

Accomplishments: Significant associations were found between low-level cognition (attention and interpretation biases) and self-reported anger components (Study 1). These findings were published in a scientific paper. Computerized cognitive interpretation training was found efficient in reducing anger-related interpretations of ambiguous faces, and in reducing behavior related to displaced anger and retaliation in the context of an interpersonal economic game (Study 6). A scientific report based on these findings is in process. Computerized attention training did not demonstrate clear evidence for reducing attention bias, although there is evidence for less behavior related to displaced anger and retaliation following this training (Study 5).

Timeline and Cost

Activities CY	13	14	15	16
Data collection and analysis Study 1				
Data collection and analysis Study 6				
Data collection and analysis Study 5				
Data collection and analysis Study 7				
Estimated Budget ($K)	**$184**	**$171**	**$174**	**$171**

Updated: (7/11/16)

Goals/Milestones

CY13 Goal – Study 1
☑ Study materials preparation, staff recruitment and training.
☑ Recruitment of participants and data collection
☑ Data recoding and preparation, Data analysis
CY14 Goals – Study 6.
☑ Study materials preparation, staff recruitment and training.
☑ Recruitment of participants and data collection
☑ Data recoding and preparation
☑ Data analysis
☑ Study materials preparation for next study (5)
☑ Writing a scientific paper based on Study 1 (published)
CY15 Goal – ☑ data collection - Study 5
CY16 Goals –
☑ Full data analysis of study 6 (with data from Bristol University collaborators)
☑ Completion of data collection and analyses - Study 5.
Comments/Challenges/Issues/Concerns
• If your timelines change you must comment.
• If you are off by more than one quarter in spending, you must comment here.
Budget Expenditure to date
Projected Expenditure: 698,748$ Actual Expenditure: 682,053 $